THE
Sportſman's Sure Guide,
OR
Gameſter's Vade-Mecum;

SHEWING

The exact ODDS at

HORSE-RACING,	COCK-FIGHTING,
LOTTERIES,	CARDS,
RAFFLES,	&c. &c.

With a TABLE, ſhewing the Odds of the Variety of Chances of throwing any Number of Points with DICE, from One to Ten incluſive;

Alſo the ODDS of

BACK-GAMMON, BOWLS, COITS, &c.

The Whole forming a complete Guide to the TURF, the COCK-PIT, the CARD-TABLE, and other Species of Public Diverſion, either in the Parlor or the Field.

By HENRY PROCTOR,
At Woodhouſe, near Maſham, in Yorkſhire.

Would ye wiſh to read of Matters
Long conceal'd from vulgar Eyes,
Harry Proctor for ye caters;—
Buy the Book, and win the Prize.

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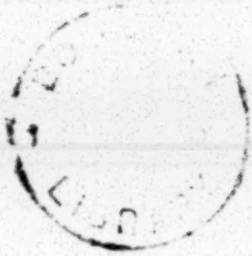

PREFACE.

HAVING had many leiſure hours ſome years ago, I applied ſome of them to the calculation of chances, which I reduced into as narrow a compaſs as poſſible, by forming them into regular Tables (for my own private amuſement) by which means they became leſs burthenſome in the pocket, and more readily referred to. When I had advanced thus far, I judged it proper to publiſh them for the uſe of others, as many reſort to Horſe Races, Cockings, &c. and lay their money at random, for want of ſome help of this ſort, whereby they might ſport with much greater certainty; for that reaſon I have made it as plain as poſſible, and notwithſtanding I have compiled them in

ſo conciſe a compaſs, there is ſcarce any thing that occurs in a Sportſman's practice, which may not be found in this ſmall Treatiſe.

As the utility is ſo great in compariſon to the price, no Sportſman ought to be without it; and I doubt not but thoſe who purchaſe it will find their money well laid out.

The greateſt advantage a Sportſman has, is by betting different ways, for by making various hedge-bets he may often reduce his chance to a certainty of winning.

And firſt, in order to inform my readers how to ſport at Horſe Races, I have given ſuch examples as will enable thoſe (who give due attention to what is here advanced) to bet with the greateſt certainty of gain.

Secondly, the great variety of Tables of Odds in Cock-Fighting, will point out, at firſt ſight, what the exact odds are in any caſe whatever: Suppoſe there are nine battles in a match to ſight, wherein there is even money on each ſide evey battle; and, that one ſide is already four battles a-head, of courſe the other ſide muſt win. Look in the firſt Table, and you'll find 7 out of 9 is 10 $\frac{6}{46}$ to 1, which is the odds.

Thirdly, you have a Table ſhewing the odds for and againſt one ſide, or either ſide, winning a certain number of battles, out of a certain number.

Fourthly, the odds of a match wherein there are even battles.

Fifthly, a Table ſhewing the odds againſt each ſide winning two battles running, let the odds in each battle be what they may.

The

The odds in Lotteries, with a Table ſhewing the Chances for throwing any number of points, with any number of dice, from one to ten, incluſive.

The odds at Back-Gammon.

A Table of Points, with the Chances for hitting.

Directions for playing your game.

The odds of the Game of Whiſt.

A Table ſhewing the Chances for the Dealer and his Partner holding 1, 2, 3, or 4 honours.

A Table ſhewing the Chances for a Perſon that is not Dealer holding any number of Trumps.

A Table ſhewing the Chances for ſome one holding any Trumps.

A Caſe

A Caſe to demonſtrate the Advantage of a See-Saw

An uncommon Caſe at Cribbage.

A critical Caſe at All-Fours.

A critical Caſe at Put.

A Table ſhewing the Odds of the Game.

At Bowls or Coits, when 2, 3, 4, or 6 play.

It may be queſtioned how it is poſſible to calculate the Odds in Horſe-Racing, when perhaps the Jockies in a great meaſure know, before they ſtart, which is to win?

In anſwer to which, give me leave to propoſe a queſtion; ſuppoſe I toſs up a halfpenny, and you are to gueſs whether it

will

will be head or tail, muſt it not be allowed you have an equal chance to win, as to loſe ?

Or if I hide a halfpenny under a hat, and I know what is, have not you as good a chance to gueſs right, as if it were toſſed up ?

My knowing it to be a head, can be no hindrance to you, as long as you have the liberty of chooſing either head or tail.

But there are ſome people that build ſo much upon their own opinion, that ſhould their favourite horſe happen to be beat, they will have it to be owing to ſome fraud.

A CALCULATION OF CHANCES.

THE ODDS IN HORSE-RACING.

AS the Odds in Horſe-Racing cannot be reduced into regular Tables, as thoſe are in Cock-fighting; it will not be unneceſſary, for that reaſon, to point out the method how to calculate them oc-

caſionally,

caſionally, which I ſhall endeavour to do in as plain and eaſy a manner as poſſible; and the more ſo, as this Treatiſe may be conſulted by ſome Sportſmen who are not converſant in figures.

Firſt, you are to underſtand, the expectation on an event, is conſidered as the preſent certain value or worth, of whatſoever ſum or thing is depending on the happening of that event.

Therefore, if the expectation on an event, be divided by the value of the thing expected, on the happening of that event; the quotient will be, the probability of happening.

EXAMPLE I.

Suppoſe Two Horſes, viz. A and B, to ſtart for 50 l. and there are even bets on both ſides, it is evident that the preſent

ſent value or worth of each of their expectations will be 25 l. and the probabilies $\frac{25}{50}$ or $\frac{1}{2}$.

For if they had agreed to divide the prize between them, according as the bets ſhould be at the time of their ſtarting, they would each of them be intitled to 25 l.; but, if A had been thought ſo much ſuperior to B, that the bets had been 3 to 2 in his favour, then the real value of A's expectation would have been 30 l. and that of B's only 20 l. and their ſeveral probabilities $\frac{30}{50}$ and $\frac{20}{50}$.

EXAMPLE II.

Let us ſuppoſe three horſes to ſtart for a ſweepſtakes, viz. A, B, and C, and that the odds are 8 to 6, A againſt B; and 6 to 4, B againſt C, What is the odds; A againſt C, and the Field againſt A?

ANSWER.

2 to 1, A against C; and 10 to 8, or 5 to 4, the Field against A. See the following Scheme:

A's expectation is	8
B's expectation is	6
C's expectation is	4
	18

But if the bets had been 7 to 4, A against B; and even money, B against C; then the odds would have been 8 to 7, the Field against A, as is shewn in the following scheme:

7	A.
4	B.
4	C.
15	

But, as this is the basis upon which all the rest depends, I shall endeavour to make

make it as plain as poſſible, by giving another example or two, and then proceed.

EXAMPLE III.

Suppoſe the ſame three as before, and the common bets 7 to 4, A againſt B; 21 to 20, or gold to ſilver, B againſt C; we muſt ſtate it thus, viz. 7 guineas to 4, A againſt B; and 4 guineas to 4 l. B againſt C; which being reduced into ſhillings, the ſcheme will ſtand as follows:

147	A's expectation.
84	B's expectation.
80	C's expectation.
211	

By which it will be 164 to 147, the the Field againſt A, (ſomething more than 39 to 35). Now, if we compare this with the laſt example, we may conclude it to be right; for, if it had been 40 to

35,

35, then it would have been 8 to 7; exactly as in the laſt example.

But as ſome perſons may be at a loſs to know why I ſelect the numbers 39 and 35, it is requiſite to ſhew ſuch as have the leaſt knowledge of the Sliding-Rule, how they may readily find them.

RULE.

Set 164 upon the line, A to 147 upon the Slider B, and then look all along, till you ſee two whole numbers which ſtand exactly one againſt the other (or as near as you can come), which in this caſe you find 39 on A, to ſtand againſt 35 on the Slider B (very nearly). But as $\frac{164}{311}$ and $\frac{147}{311}$ are in the loweſt terms, there are no leſs numbers, in the ſame proportion, as 164 to 147: 39 and 35 being the neareſt, but not quite exact.

EXAMPLE

EXAMPLE IV.

Let us ſuppoſe the ſame three as before, and the bets to be 7 to 4, A againſt B; and gold to ſilver, C againſt B; What will the odds be, the Field againſt A?

ANSWER.

41 to 35.

For, as it is 7 l. to 4, A againſt B; and 4 guineas to 4 l. C againſt B, the ſcheme will ſtand as follows:

140	A.
80	B.
84	C.
304	

A's expectation will only be 140, B's expectation will be 80; and that of C will be 84; for if they ſhould agree to to divide the prize among them according to the bets, and that the whole ſtake or prize

prize to be run for was 304 l.; then A would be intitled to 140, B 80, and C 84 l.; and the odd's would be 164 to 140 or 41 to 35 exactly.

EXAMPLE V.

Again, ſuppoſe three horſes to ſtart, viz. A, B, and C; and that the bets are 5 to 3, A againſt the Field; and 2 to 1, B againſt C. What is the odds that A is not hindmoſt?

ANSWER.

$12\frac{12}{13}$ to 1.

The following ſcheme ſhews their ſeveral chances or expectations for winning, viz.

A	5
B	2
C	1
Total	8

From

From which it appears, that the ſum of all their chances is 8; out of which A has 5 chances of winning, and C has only 1: ſome may aſſert, indeed, that there is as great a probability for A to be hindmoſt, as there is for C to be foremoſt, viz. $\frac{1}{8}$, and the odds 7 to 1; whereas the true odds is 12 $\frac{12}{13}$ to 1, as above. The probability of B's coming firſt is $\frac{2}{8}$; if that ſhould ſo happen, then the probability of C's coming ſecond would be $\frac{1}{6}$; but the probability of getting into that circumſtance, being only $\frac{2}{8}$, the true expectation of B's coming firſt and C ſecond, is therefore only $\frac{2}{8}$ of $\frac{1}{6}$, or $\frac{1}{24}$: and, ſecondly, the probability of C's coming firſt, and B ſecond, it is manifeſt from the ſame way of reaſoning, would be $\frac{1}{8}$ of $\frac{2}{7}$, or $\frac{1}{28}$, which being added to $\frac{1}{24}$, $= \frac{52}{672}$, or $\frac{13}{168}$ the probability of A's coming hindmoſt; which being deducted from unity,

 there

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A	5
B	2
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there remains $\frac{155}{168}$, the probability of its failing; and the required odds 155 to 52, or $12\frac{12}{13}$ to 1. (See more of this in the 16th Example, where four are ſuppoſed to ſtart.)

It ſometimes happens when only 3 or 4 horſes ſtart, that ſome of the Knowing Ones will undertake to poſt them, that is, to name the particular order in which each horſe will come in; viz. A firſt, B ſecond, D third, &c. and as theſe horſes may change places as often as three bells, ſo may four horſes change places as often as four bells, &c. Two bells will only admit of being changed twice, and the ſame of two horſes, viz. A, B, and B, A; Three may change places ſix times, as,

A, B, C,
A, C, B,
B, A, C,
C, A, B,
C, B, A,
B, C, A,

For

For 2 multiplied by 3 = 6, and as there are ſix ways that they may change places, and only one way for them to come in the ſame order, as A, B, C, it is very plain that it is 5 to 1 againſt their coming in the ſame order; and, as 2, multiplied by 3, multiplied by 4, is equal to 24, ſo 4 bells may be changed 24 ways, and 5 bells 120 ways, &c.

In order to explain this ſomewhat more, let us ſuppoſe three tickets equally alike, one marked A, the ſecond B, and the third C; and to be rolled up, and put into a bag, and a perſon to draw them out blindford, one by one, it is 5 to 1 they do not come out in the ſame order, viz. A firſt, B next, and C laſt; becauſe the probability of A coming out firſt is only $\frac{1}{3}$; now, if it happen to be drawn firſt then the probability for drawing B next is $\frac{1}{2}$, which being multiplied by $\frac{1}{3}$, is equal

equal to $\frac{1}{6}$ the probability of their coming in that very order; which, being subtracted from unity, the remainder will be $\frac{5}{6}$, the probabilitiy of its failing; and the odds will be 5 to 1. (See Simpſon's Laws of Chance, page 7.)

If there were four things drawn as before, viz. A, B, C, and D, then the odds will be 23 to 1, that they do not all come out in the ſame order, viz, A, B, C, D, &c. for $\frac{1}{4}$, of $\frac{1}{3}$ of $\frac{1}{2}$, is equal to $\frac{1}{24}$, the probability of its happening; which being ſubtracted from unity, the remainder will be $\frac{23}{24}$, the probability of its failing, and the odds 23 to 1; yet, notwithſtanding this is the ground-work upon which the reſt depend, it will not hold good in Horſe-racing, becauſe horſes are not all equal.

For,

For, let us suppose three horses to start, viz. A, B, and C; and that the bets are 2 to 1, A against B; and 5 to 4, B against C. What will be the odds against posting them?

ANSWER.

121 to 50.

First, draw a scheme of their respective expectations, as follows:

$$\begin{array}{rl} 10 & A, \\ 5 & B, \\ 4 & C, \\ \hline 19 & \end{array}$$

Thus it appears that the probability of A coming first is $\frac{10}{19}$. Secondly, if A should come first, the probability of B coming second will be $\frac{9}{5}$; now $\frac{10}{19}$ multiplied by $\frac{9}{5}$ will equal $\frac{50}{171}$, the probability for its happening; which being subtracted from

from unity, the remainder will be $\frac{121}{171}$; the probability of its failing, and the odds 121 to 50, almoſt 17 to 7: for as 50 on A is to 121 upon B, ſo is 7 upon A to 17 upon B, nearly.

EXAMPLE VI.

Let us ſuppoſe four horſes, viz. A, B, C, and to ſtart for a ſweepſtakes one ſingle heat, and the bets to be 12 to 7, A againſt B; 7 to 5, B againſt C; and 5 to 4, C againſt D. Now, according to the foregoing bets, What is the odds A againſt C, A againſt D, B againſt D, and the Field againſt each of the horſes ſeperately.

To ſolve theſe queſtions draw the following ſcheme of their ſuperiority according to the bets above.

12 A,
7 B,
5 C,
4 D,
———
28

It will appear that the odds will be 12 to 5, A againſt C; 12 to 4 (or 3 to 1), A againſt D; and, as the numbers 12, 7, 5, and 4, repreſents each horſe's expectation, it will follow that the odds againſt A's winning will be 16 to 12 (or 4 to 3); becauſe 12 is A's expectation, and 16 the ſum of all the other expectations; therefore A's probability of winning will be, $\frac{12}{28}$, and that of his loſing $\frac{16}{28}$; conſequently the odds will be 8 to 6 (or 4 to 3) the Field againſt A; 21 to 7 (or 3 to 1) the Field againſt B; 23 to 5 the Field againſt C; and 24 to 4 (or 6 to 1) the Field againſt D.

EXAMPLE VII.

Let us ſuppoſe five horſes to ſtart, viz. A, B, C, D, and E, and that the bets are 7 to 6, A againſt any one; and even bets among the reſt. What is the odds that A does not win.

ANSWER.

25 to 6.

In order to ſolve this, draw a ſcheme of their reſpective probabilities as follows:

7 A,
6 B,
6 C,
6 D,
6 E,

31

By this ſcheme you may readily perceive the odds to be 24 to 7, almoſt 7 to 2, the Field againſt A; and 25 to 6, or ſomething more than 4 to 1 (that is, $4\frac{1}{6}$ to 1,) the Field againſt any of the other four.

EXAMPLE VIII.

Let us ſuppoſe five to ſtart, viz. A's black horſe, B's bay gelding, C's bay gelding, D's grey mare, and E's grey mare; and that the bets are 8 to 6, A againſt B; even money B againſt C; 3 to

2 C

2 C againſt D, and even bets D againſt E. Then what will the odds be, the Field againſt A, and the Geldings againſt the Mares?

Before you can ſolve this it will be neceſſary to form a ſcheme of their reſpective probabilities as follows:

8 A,
6 B,
6 C,
4 D,
4 E,

28

By this ſcheme it will appear that the odds will be 20 to 8 (or 5 to 2), the Field againſt A, for the reaſons before given; and it will be 6 to 4 the Geldings againſt the Mares. (See Simpſon's Laws of Chance, page 5 and 6.) But it is 16 to 9 that both the Geldings don't beat

Mares. (See the Table of Two Battles, under the Article Cock-fighting, where you will find it to be 7 s. 1 d. $\frac{1}{4}$, and $\frac{1}{5}$, to 4s.)

EXAMPLE IX.

Let us ſuppoſe ſix to ſtart, viz. Lord A's grey horſe, Lord B's grey mare, Lord C's bay horſe, the Duke of D's bay mare, the Duke of E's black horſe, and the Duke of F's black mare; and, alſo, let us ſuppoſe the bets to be as follows, viz. Gold to Silver Lord A's grey horſe againſt Lord C's grey mare; even money. Lord's B's grey mare againſt Lord C's bay horſe; 8 to 6 Lord C's bay horſe againſt the duke of D's bay mare; even money the duke of D's bay mare againſt the Duke of E's black horſe; and 5 to 4 the Duke of E's black horſe, againſt the Duke of F's black mare.

Then

Then, What is the odds the Lords againſt the Dukes, the three horſes againſt the three mares, the two greys againſt the two bays, the two greys againſt the two blacks, and the two bays againſt the two blacks.

Lord A's grey horſe, Lord B's grey mare, and the Duke of F's black mare, againſt Lord C's bay horſe, the Duke of D's bay mare, and the Duke of E's black horſe.

First draw a ſcheme of their expectations as follows:

21 Lord A's grey horſe,
20 Lord B's grey mare,
20 Lord C's bay horſe,
15 the Duke of D's bay mare,
15 the Duke of E's black horſe,
12 the Duke of F's black mare.

103

By which it appears very plain to be 61 to 42, ſomething more than 16 to 11 found by the Sliding-Rule, by ſetting 61 upon A, to 42 upon B. I find 16 upon A ſtand againſt 11 upon B very nearly, the Lords againſt the Dukes. Secondly, it is 56 to 47, the Horſes againſt the Mares (almoſt 6 to 5); for, as 56 upon A, is to 47 upon B, ſo is 6 upon A, to little more than 5 upon B, or as 47 upon A, is to 56 upon B, ſo is 5 upon A to very near 6 upon B. Thirdly, it is 41 to 35 the Greys againſt the Bays (or ſomething better than 7 to 6), found by the Sliding-Rule, as before; for 35 upon A, is to 41 upon B, ſo is 6 upon A to very near 7 upon B. Fourthly, it is 41 to 27 the Greys againſt the Blacks (better than 6 to 4). Fifthly, it is 35 to 27, the Bays againſt the Blacks, almoſt 13 to 10, for as 35 on A is to 27 on B, ſo is 13 upon A, to a little more than 10 upon B. And,

Laſtly,

Laſtly, it is 53 to 50 Lord A's grey horſe, Lord B's grey mare, and the Duke of F's black mare, againſt Lord C's bay horſe, the Duke of D's bay mare, and the Duke of E's black horſe, ſomething more than 18 to 17; for as 50 upon A, is to 53 upon B, ſo is 17 upon A; to a little more than 18 on B.

EXAMPLE X.

Suppoſe eight to ſtart, and their reſpective probabilities for winning as follows:

5 A,
1 B,
1 C,
1 D,
1 E,
1 F,
1 G,
1 H.

12

First,

First, it will be 7 to 5, that A will not win; and, Secondly, 15 to 7, that he will come either first or second, for $\frac{7}{12} \times \frac{6}{11}$, $= \frac{7}{22}$; which being subtracted from unity, there remains $\frac{15}{22}$, the probability of his coming either first or second, and the odds 15 to 7.

EXAMPLE XI.

Suppose eight start, viz. A, B, C, D, E, F, G, and H; and the bets to be 2 to 1, A against any thing; and even money among the rest; as follows:

2 A,
1 B,
1 C,
1 D,
1 E,
1 F,
1 G,
1 H.
———
9

First,

Firſt, it is 7 to 2, that A will not win. Secondly, it is 7 to 5 that he comes neither firſt nor ſecond; $\frac{7}{9} \times \frac{6}{8} = \frac{7}{12}$ the probability that he neither comes firſt nor ſecond, which being ſubtracted from unity, there remains $\frac{5}{12}$, the probability of his coming either firſt or ſecond, and the odds 7 to 5: and, Thirdly, it is 7 to 5 that he either comes firſt, ſecond, or third; $\frac{7}{9} \times \frac{6}{8} \times \frac{5}{7} = \frac{5}{12}$, the probability that he neither comes firſt, ſecond, nor third; which being ſubtracted from unity, there remains $\frac{7}{12}$, the probability of his coming either firſt, ſecond, or third; and the odds 7 to 5.

EXAMPLE XII.

Suppoſe eight to ſtart, viz. A, B, C, D, E, F, G, and H; and the bets to be 5 to 2 A againſt any one; and even money among the reſt, as in the following ſcheme:

5 A,

5 A,
2 B,
2 C,
2 D,
2 E,
2 F,
2 G,
2 H,

———

19

First, it is 14 to 5, the Field against A, almost 3 to 1.

Secondly, it is 168 to 155, something more than 13 to 12, that A comes neither first nor second; for $\frac{14}{19} \times \frac{12}{17} = \frac{168}{323}$, the probability; which being deducted from unity, there remains $\frac{155}{323}$, and therefore the odds is 168 to 155.

Thirdly, it is 211 to 112, that he comes either first, second, or third; for $\frac{14}{19} \times \frac{12}{17} \times \frac{10}{15} = \frac{112}{323}$, the probability that he neither comes

comes firſt, ſecond, nor third; which being deducted from unity, there remains $\frac{211}{323}$, the probability of his being one of the firſt three, and the odds 211 to 112.

EXAMPLE XIII.

Suppoſe four to ſtart, viz. A, B, C, and D; and their ſeveral expectations for winning, as follows:

3 A,
3 B,
2 C,
2 D,

10

By which it will be 6 to 4 A and B againſt C and D.

Secondly, it will be 7 to 3 the Field againſt A, and the ſame odds againſt B's winning.

Thirdly, that A comes either firſt or ſecond is 81 to 59; for A's expectation of winning is $\frac{3}{10}$, and the probability of B's coming firſt, and A's ſecond, is $\frac{3}{10} \times \frac{3}{7} = \frac{9}{70}$; and the probability of C's coming firſt, and A ſecond, is $\frac{2}{10} \times \frac{3}{8} = \frac{3}{40}$; and the probability of D's coming firſt, and A ſecond, is alſo $\frac{3}{40}$. And $\frac{3}{70} + \frac{3}{40} + \frac{3}{40} = \frac{39}{140}$, the probability of A's coming ſecond, which being added to $\frac{3}{10}$ (his expectation of being firſt,) $= \frac{81}{140}$, the probability of his being either firſt or ſecond, and odds the 81 to 59.

Fourthly, it is 26 to 9, that A and B, are not firſt and ſecond. For $\frac{3}{10} \times \frac{3}{7} = \frac{9}{70}$, the probability of A's coming firſt, and B ſecond; then conſequently $\frac{9}{70}$ muſt be the probability of B's coming firſt and A ſecond; which, being added together $=$ $\frac{18}{70}$, or $\frac{9}{35}$, the probability of their coming

firſt

firſt and ſecond; which being deducted from unity, there remains $\frac{26}{35}$, their not coming firſt and ſecond; and the odds 26 to 9, not quite 3 to 1.

Or thus, $\frac{6}{10} \times \frac{3}{7} = \frac{9}{35}$, the probability of their coming firſt and ſecond, as before.

Fifthly, Sir Richard Hazard laid 6 guineas to 4, A againſt C; and 6 guineas to 4 B againſt D; What are the odds that he doth not win both theſe bets.

ANSWER.

16 to 9.

For $\frac{6}{10} \times \frac{6}{10} = \frac{9}{25}$, his expectation of winning both; which being deducted from unity, there remains $\frac{16}{25}$, the probability that he doth not win both, and the odds 16 to 9, ſomething more than 7 to 4.

EXAMPLE XIV.

There are four horſes to ſtart for a ſweepſtakes, viz. A, B, C, and D; and they are ſuppoſed to be as equally matched as poſſible.

Now, Mr. Sly has laid 10 guineas A againſt C, and alſo 10 guineas againſt D.

Likewiſe, Mr. Rider laid 10 guineas A againſt C; and alſo he laid 10 guineas B againſt D.

After which Mr. Dice laid Mr. Sly 10 guineas to 4, that he will not win both his bets.

Secondly, he laid Mr. Rider 10 guineas to 4, that he will not win both his bets.

Now I deſire to know what Mr. Dice's advantage, or diſadvantage, is, in laying theſe two laſt-mentioned wagers.

Firſt,

Firſt, the probabilty of Mr. Sly's winning both his bets is $\frac{1}{3}$ of 14 guineas; and Mr. Dice's expectation is $\frac{2}{3}$ of 14 guineas, or 9 l. 16 s. which being deducted from his own ſtake (10 guineas) there remains 14 s. his diſadvantage in that bet.

Secondly, Mr. Rider's expectation of winning his two bets is $\frac{1}{4}$, and, therefore, Mr Dice's expectation of the 14 guineas, is $\frac{3}{4}$, or 11 l. 0 s. 6 d. from which deduct 10 guineas (his own ſtake) there remains 10 s. 6 d. his advantage in this bet; which being deducted from 14 s. (his diſadvantage in the other) there remains 3 s. 6 d. his diſadvantage in laying both theſe bets.

EXAMPLE XV.

Suppoſe ſeven to ſtart, viz. A, B, C, D, E, F, and G, all equal, to run one ſingle heat,

heat; the firſt to have the prize, and the ſecond the ſtakes.

Firſt, the probability of A's winning is $\frac{1}{7}$, and the odds 6 to 1.

Secondly, the probability of A's winning either prize or ſtakes, may be obtained by ſeeking ſeverally the probabilities of his coming firſt and ſecond, and add them together thus, viz. The probability of his coming firſt is $\frac{1}{7}$ (as before), and $\frac{6}{7} \times \frac{1}{6} = \frac{1}{7}$ the probability of his coming ſecond; which being added to $\frac{1}{7}$ (the probability of his coming firſt) $= \frac{2}{7}$; the probability of his coming either firſt or ſecond; and the odds is 5 to 2 that he neither wins the prize or ſtakes; as may be ſeen at once in the following ſcheme:

1 A,
1 B,
1 C,
1 D,
1 E,
1 F,
1 G,

———

7

Or, it may be found at one operation, by ſeeking the probability of his neither coming firſt nor ſecond; thus $\frac{6}{7} \times \frac{5}{6} = \frac{5}{7}$, the probability that he neither wins prize nor ſtakes, as above.

What is the odds that A is neither firſt, ſecond, nor third?

ANSWER.

4 to 3. As may be ſeen above at firſt ſight: or by ſeeking ſeverally the probabilities of his coming firſt, ſecond, and third;

third; and adding them together: or by ſeeking the probability of his neither coming firſt, ſecond, ncr third; which is done at one operation, thus; $\frac{6}{7} \times \frac{5}{6} \times \frac{4}{5} = \frac{4}{7}$, which, being deducted from unity, there remains $\frac{3}{7}$, the probability of his being one of the firſt three, and the odds 4 to 3.

And provided A and B were both to belong to one perſon, then the probability of that perſon's winning the prize, would be $\frac{2}{7}$, and the odds 5 to 2.

Secondly, it is 11 to 10 that he either wins the prize or ſtakes; thus $\frac{5}{7} \times \frac{4}{7} = \frac{10}{21}$, the probability of his winning neither which, being deducted from unity, leaves $\frac{11}{21}$, the probability of his winning one of them; and the odds 11 to 10.

Thirdly, it is 20 to 1 that he doth not win both the prize and ſtakes. Calculate thus,

thus, viz. $\frac{2}{7}\times\frac{1}{6}=\frac{1}{21}$, the probability of his winning both, and the odds 20 to 1.

And the probability of A and B, both coming in the first three, is $\frac{1}{7}$. Calculated thus, $\frac{3}{7}\times\frac{2}{6}=\frac{1}{7}$, the probability, and the odds 6 to 1. Proved thus, find the probabilities of their coming in the six different orders as follows, whose sum is the probability required.

A, B, C, &c. $\frac{1}{7}\times\frac{1}{6} = \frac{1}{42}$,
A, C, &c. B, $\frac{1}{7}\times\frac{5}{6}\times\frac{1}{5} = \frac{1}{42}$,
B, A, C, &c. $\frac{1}{7}\times\frac{1}{6} = \frac{1}{42}$,
B, C, &c. A, $\frac{1}{7}\times\frac{5}{6}\times\frac{1}{5} = \frac{1}{42}$,
C, &c. A, B, $\frac{5}{7}\times\frac{1}{6}\times\frac{1}{5} = \frac{1}{42}$,
C, &c. B, A, $\frac{5}{7}\times\frac{1}{6}\times\frac{1}{5} = \frac{1}{42}$,

Total $\frac{6}{42}$, or $\frac{1}{7}$.

 And,

And, laftly, it is 5 to 2, that either A, or B, or both A and B, are in the firft three, for $\frac{4}{7} \times \frac{3}{6} = \frac{2}{7}$, the probability that neither of them comes in firft three; which being deducted from unity, there remains $\frac{5}{7}$, the probability of one or both coming in the firft three. Odds 5 to 2.

EXAMPLE XVI.

Suppofe four ftart, viz. A, B, C, D; and the odds to be 8 to 6, A againft B; 6 to 4, B againft C; and 2 to 1, C againft D.

And that Sir Thomas Turf laid 500 guineas, that D will come hindmoft; What is his advantage, or difadvantage, in laying the faid bet.

Find the feveral probabilities of their coming in the fix different orders, as followeth.

A, B, C,

A, B, C, $\frac{4}{10} \times \frac{6}{3} \times \frac{2}{3} = \frac{2}{15}$, or $\frac{245000000}{1837500000}$

A, C, B, $\frac{4}{10} \times \frac{2}{6} \times \frac{3}{4} = \frac{1}{10}$, or $\frac{183750000}{1837500000}$

B, A, C, $\frac{3}{10} \times \frac{4}{7} \times \frac{2}{3} = \frac{4}{35}$, or $\frac{210000000}{1837500000}$

B, C, A, $\frac{3}{10} \times \frac{2}{7} \times \frac{4}{5} = \frac{12}{175}$, or $\frac{126000000}{1837500000}$

C, A, B, $\frac{2}{10} \times \frac{4}{8} \times \frac{3}{4} = \frac{3}{40}$, or $\frac{137812500}{1837500000}$

C, B, A, $\frac{2}{10} \times \frac{3}{8} \times \frac{4}{5} = \frac{3}{50}$, or $\frac{110250000}{1837500000}$

Total $\frac{1012812500}{1837500000}$

Which is the probability of D's coming hindmoſt; therefore, Sir Thomas's expectation of the 1000 guineas, is $\frac{10128125}{18375000}$ of that ſum; from which deduct his own ſtake, there remains $\frac{940625}{18375}$ of a guinea, or which is the ſame 51 $\frac{28}{147}$ guineas, or 53 l. 15 s. the advantage required, or ſo much is the ſum he might give upon equality of chance, to another perſon to lay him the ſame wager.

Secondly,

Secondly, Let us ſuppoſe Sir Robert Raſh to have laid 600 guineaa to 400, that D will come hindmoſt. What will his advantage or diſadvantage be, by laying that wager.

You have found already the probability of D coming hindmoſt to be $\frac{10128125}{18375000}$. Therefore Sir Robert's expectation of the 1000 guineas is $\frac{10128125}{18375000}$ of that ſum, which being deducted from his own ſtake, there remains 48 $\frac{14875}{18375}$ guineas, or 51l. 5s. 0 d. $\frac{168}{735}$ his diſadvantage; or ſo much he ought to give, upon equality of chance, to another perſon to take the bet off his hands.

This ſhews the advantage, or diſadvantage, in laying leſs or more than the true odds; which, in this caſe, is 10128125 to 8246875, not quite 16 to 13.

A PA-

A PARADOX.

IT happened at Malden in Eſſex, in the year 1738, that three horſes (and no more than three) ſtarted for a 10 l. plate, and they were all three diſtanced the firſt heat, according to the common rules in Horſe-racing, without any quibble or equivocation.

SOLUTION.

The firſt run on the inſide of the poſt; the ſecond wanted weight; and the third fell, and broke a fore-leg.

(See Cheany's Horſe-racing Book.)

THE

THE

ODDS IN COCK-FIGHTING.

Battles.		Odds.
3 out of 4, is	———	$2\frac{1}{5}$ to 1.
4 out of 5, is	———	$4\frac{1}{3}$ to 1.
4 out of 6, is	———	$1\frac{10}{11}$ to 1.
5 out of 6, is	———	$8\frac{1}{7}$ to 1.
5 out of 7, is	———	$3\frac{12}{29}$ to 1.
6 out of 7, is	———	15 to 1.
5 out of 8, is	———	$1\frac{70}{93}$ to 1.
6 out of 8, is	———	$5\frac{34}{37}$ to 1.
7 out of 8, is	———	$27\frac{4}{9}$ to 1.
6 out of 9, is	———	$2\frac{122}{130}$ to 1.
7 out of 9, is	———	$10\frac{6}{46}$ to 1.
8 out of 9, is	———	$50\frac{1}{5}$ to 1.
6 out of 10, is	———	$1\frac{252}{386}$ to 1.

7 out

Battles.		Odds.
7 out of 10, is	———	$4\frac{144}{176}$ to 1.
8 out of 10, is	———	$17\frac{16}{56}$ to 1.
9 out of 10, is	———	$92\frac{1}{11}$ to 1.
7 out of 11, is	———	$2\frac{362}{562}$ to 1.
8 out of 11, is	———	$7\frac{192}{232}$ to 1.
9 out of 11, is	———	$29\frac{38}{67}$ to 1.
10 out of 11, is	———	$169\frac{8}{12}$ to 1.
7 out of 12, is	———	$1\frac{924}{1586}$ to 1.
8 out of 12, is	———	$4\frac{126}{794}$ to 1.
9 out of 12, is	———	$12\frac{209}{299}$ to 1.
10 out of 12, is	———	$50\frac{67}{79}$ to 1.
11 out of 12, is	———	$314\frac{1}{13}$ to 1.
8 out of 13, is	———	$2\frac{263}{595}$ to 1.
9 out of 13, is	———	$6\frac{541}{1093}$ to 1.
10 out of 13, is	———	$20\frac{127}{189}$ to 1.
11 out of 13, is	———	$88\frac{1}{23}$ to 1.
12 out of 13, is	———	$584\frac{1}{7}$ to 1.

8 out

Battles.		Odds.
8 out of 14, is	——	$1\frac{608}{1519}$ to 1.
9 out of 14, is	——	$3\frac{2492}{3473}$ to 1.
10 out of 14, is	——	$10\frac{203}{1471}$ to 1.
11 out of 14, is	——	$33\frac{202}{235}$ to 1.
12 out of 14, is	——	$153\frac{30}{103}$ to 1.
13 out of 14, is	——	$1091\frac{4}{15}$ to 1.
9 out of 15, is	——	$2\frac{2921}{9949}$ to 1.
10 out of 15, is	——	$5\frac{3104}{4944}$ to 1.
11 out of 15, is	——	$15\frac{1712}{1941}$ to 1.
12 out of 15, is	——	$55\frac{512}{576}$ to 1.
13 out of 15, is	——	$269\frac{98}{121}$ to 1.
14 out of 15, is	——	2047 to 1.
9 out of 16, is	——	$1\frac{12870}{26333}$ to 1.
10 out of 16, is	——	$3\frac{5964}{14893}$ to 1.
11 out of 16, is	——	$8\frac{3571}{6885}$ to 1.
12 out of 16, is	——	$25\frac{94}{2517}$ to 1.
13 out of 16, is	——	$93\frac{18}{697}$ to 1.

14 out

Battles.		Odds.
14 out of 16, is	——	477 $\frac{50}{137}$ to 1.
15 out of 16, is	——	3854 $\frac{1}{17}$, to 1.
10 out of 17, is	——	1 $\frac{3602}{20613}$ to 1.
11 out of 17, is	——	5 $\frac{202}{10889}$ to 1.
12 out of 17, is	——	12 $\frac{4423}{4701}$ to 1.
13 out of 17, is	——	39 $\frac{1256}{1607}$ to 1.
14 out of 17, is	——	156 $\frac{67}{417}$ to 1.
15 out of 17, is	——	850 $\frac{9}{77}$ to 1.
16 out of 17, is	——	7280 $\frac{7}{9}$ to 1.
10 out of 18, is	——	1 $\frac{48620}{106762}$ to 1.
11 out of 18, is	——	3 $\frac{10128}{53004}$ to 1.
12 out of 18, is	——	7 $\frac{12704}{31180}$ to 1.
13 out of 18, is	——	19 $\frac{9824}{12616}$ to 1.
14 out of 18, is	——	63 $\frac{3072}{4048}$ to 1.
15 out of 18, is	——	264 $\frac{324}{988}$ to 1.
16 out of 18, is	——	1523 $\frac{16}{172}$ to 1.
17 out of 18, is	——	13796 $\frac{1}{19}$ to 1.

Battles.		Odds.
11 out of 19, is	———	$2\frac{57495}{84883}$ to 1.
12 out of 19, is	———	$4\frac{6671}{11773}$ to 1.
13 out of 19, is	———	$10\frac{10633}{10949}$ to 1.
14 out of 19, is	———	$30\frac{938}{2083}$ to 1.
15 out of 19, is	———	$103\frac{136}{1259}$ to 1.
16 out of 19, is	———	$450\frac{141}{145}$ to 1.
17 out of 19, is	———	$2743\frac{184}{191}$ to 1.
18 out of 19, is	———	$26213\frac{2}{5}$ to 1.
11 out of 20, is	———	$1\frac{184756}{431910}$ to 1.
12 out of 20, is	———	$2\frac{256726}{263950}$ to 1.
13 out of 20, is	———	$6\frac{82726}{137980}$ to 1.
14 out of 20, is	———	$16\frac{20756}{60460}$ to 1.
15 out of 20, is	———	$47\frac{6976}{21700}$ to 1.
16 out of 20, is	———	$168\frac{1452}{6196}$ to 1.
17 out of 20, is	———	$775\frac{200}{1351}$ to 1.
18 out of 20, is	———	$4968\frac{117}{211}$ to 1.
19 out of 20, is	———	$49931\frac{4}{21}$ to 1.

N. B The foregoing Calculations suppose even Money on each Battle.

A TABLE

A TABLE *ſhewing the Odds for and againſt, One Side winning a certain Number of* Battles, *when there is even Money on each* Battle.

No. of Battles.		
4	One ſide wins 3 out of 4, is	11 to 5.
5	Neither wins 4 out of 5, is	5 to 3.
6	1 ſide wins 4 out of 6, is	11 to 5.
	Neither wins 5 out of 6, is	25 to 7.
7	Neither wins 5 out of 7, is	35 to 29.
8	Neither wins 6 out of 8, is	91 to 37.
9	1 ſide wins 6 out of 9, is	65 to 63.
	Neither wins 7 out of 9, is	105 to 23.
10	Neither wins 7 out of 10, is	21 to 11.
11	1 ſide wins 7 out of 11, is	281 to 231.
	Neither wins 8 out of 11, is	787 to 232.
12	1 ſide wins 7 out of 12, is	793 to 231.
	Neither wins 8 out of 12, is	602 to 397.
13	1 ſide wins 8 out of 13, is	595 to 429.
	Neither wins 9 out of 13, is	3003 to 1093.
14	1 ſide wins 9 out of 14, is	4473 to 3719.

No. of Battles.		
15	1 wins 9 out of 15, is	9949 to 1335.
	Neither 10 out of 15, is	11435 to 4944.
16	1 wins 9 out of 16, is	26333 to 6435.
	Neither 10 out of 16, is	17875 to 14893.
17	1 wins 10 out of 17, is	20613 to 12155.
	Neither 11 out of 17, is	136136 to 126008.
20	1 wins 12 out of 20, is	131725 to 130169.

The foregoing Table is so plain, that it needs no Explanation.

When there are Five Battles to fight, it is an equal wager that one side wins Three Battles running.

And, when Six Battles, then it is 5 to 3, that one side wins Three Battles running.

It is $3\frac{21}{25}$ to 1, you don't win Two Battles running, when each Battle is 6 to 5 against you; and $2\frac{13}{36}$ to 1, you don't, when

when each Battle is 6 to 5 for you, near 50 s. to a guinea.

It is 4 $\frac{1}{16}$ to 1, you don't, when each Battle is 5 to 4 againſt you, and 2 $\frac{6}{25}$ to 1, when each Battle is 5 to 4 for you.

It is 5 $\frac{1}{4}$ to 1 you don't, when each Battle is 6 to 4 againſt you, and 1 $\frac{7}{9}$ to 1 you don't, when each Battle is 6 to 4 for you.

It is 8 to 1 you don't, when each Battle is 2 to 1 againſt you, and 5 to 4 you don't win Two Battles running, when the odds in each Battle is 2 to 1 for you.

Suppoſing each Battle 6 to 5 for you, it is 94176 to 66875 (above 7 to 5) you win the odd Battle out of 5; but it is 120875 to 40176 (above 3 to 1) you don't

don't win 4 out of the 5; and almoſt 20 to 1 you don't win all 5; but above 50 to 1 you don't loſe all 5, and near 6 $\frac{4}{11}$ to 1 you don't loſe 4 out of 5; and if each Battle be 5 to 4 for you, it is 35625 to 23424 (above 6 to 4) you win the odd Battle out of the 5, and 17 $\frac{2799}{3125}$ to 1 you don't win all 5; but it is 6 $\frac{7081}{7424}$ to 1 you don't loſe 4 out of 5, and 56 $\frac{681}{1024}$ to 1, you don't loſe all 5.

When there are only Two Battles to fight, it is 5 $\frac{1}{4}$ to 1 you don't win both, when the odds is 6 to 4 againſt you; and 1 $\frac{7}{9}$ to 1 you don't, when each Battle is 6 to 4 for you.

When the odds are 2 to 1 for you, it is 5 to 4 you don't win Two Battles running; and 8 to 1 you don't loſe both.

When

When there are Four Battles to fight, and the odds are 2 to 1 for you, then it is 65 to 16, or 4 $\frac{1}{16}$ to 1 you do not win all 4; but it is 80 to 1 you do not lose all.

And, if the odds are 2 to 1 for you then it will be 131 to 132 that you do not win 4 out of the 5, and 211 to 32, or 6 $\frac{19}{32}$, to 1 you do not win all 5; but it is 232 to 11 you do not lose 4 out of the 5; and 242 to 1 you do not lose all 5; and, likewise, it is 1248 to 939 you do not win 5 out of 7, and 1911 to 276 you do not win 6 out of 7, and 2059 to 128 or 16 $\frac{11}{128}$ to 1, you do not win all 7; but it is 2078 to 109 you do not lose 5 out of 7; and 2172 to 15, or 144 $\frac{4}{5}$ to 1 you do not lose 6, and 2186 to 1, not all 7.

The odds of a match in which there are even Battles, and one side is 3, 4, or any other number of Battles a head, it is double

ble the odds you do not tye the match; more the odds you do not win it, less 1 to 2.

EXAMPLE.

Suppose in a match of Thirty Battles, one side was 3 a head, and but seven Battles to fight; then the other side must win 5 out of the 7 to tye, and 6 out of 7 to win the match; look in the table, and you will find it is $3\frac{12}{29}$ to 1, not 5, and 15 to 1; not 6 out of 7, The double of $3\frac{12}{29}$, is $6\frac{24}{29}$, which being added to 15, is $21\frac{24}{29}$, less 1, is $20\frac{24}{29}$ to 2, or $10\frac{12}{29}$ to 1, is the odds of such a match.

Suppose Nine Battles to fight, and one side is Five Battles a head, then the other side must win 7 out of 9 to save, and 8 out of 9 to win, therefore the odds will be $69\frac{43}{65}$ to 1.

Odds in each Battle.	Odds in the Main of Three Battles.	Odds in the Main of Five Battles.	Odds in the Main of Seven Battles.
2 to 1	is 2 $\frac{6}{7}$ to 1	is 3 $\frac{39}{81}$ to 1	is 4 $\frac{292}{379}$ to 1
3 to 2	is 1 $\frac{37}{44}$ to 1	is 2 $\frac{149}{992}$ to 1	is 2 $\frac{10205}{22640}$ to 1
3 to 1	is 5 $\frac{2}{5}$ to 1	is 8 $\frac{35}{53}$ to 1	is 13 $\frac{50}{289}$ to 1
5 to 4	is 1 $\frac{121}{304}$ to 1	is 1 $\frac{12199}{23426}$ to 1	is 1 $\frac{1148281}{1817344}$ to 1
5 to 3	is 2 $\frac{13}{81}$ to 1	is 2 $\frac{2857}{4509}$ to 1	is 3 $\frac{14636}{127413}$ to 1
6 to 5	is 1 $\frac{181}{575}$ to 1	is 1 $\frac{29301}{65875}$ to 1	is 1 $\frac{3843421}{7821875}$ to 1
7 to 6	is 1 $\frac{253}{972}$ to 1	is 1 $\frac{53341}{158976}$ to 1	is 1 $\frac{10496389}{26126064}$ to 1
7 to 5	is 1 $\frac{214}{325}$ to 1	is 1 $\frac{38166}{43125}$ to 1	is 2 $\frac{285577}{2890875}$ to 1
7 to 4	is 2 $\frac{131}{400}$ to 1	is 2 $\frac{37019}{41344}$ to 1	is 3 $\frac{2110915}{4344064}$ to 1
8 to 6	is 1 $\frac{73}{135}$ to 1	is 1 $\frac{4441}{6183}$ to 1	is 1 $\frac{252169}{285687}$ to 1

Suppose even Betts on both Sides, then one wins

3 out of 4 is	5 to	3,	or	1	$\frac{2}{3}$	to 1
6 out of 9 is	65 to	63,		1	$\frac{2}{63}$	to 1
7 out of 11 is	231 to	181,		1	$\frac{50}{181}$	to 1
8 out of 13 is	2380 to	1716,		1	$\frac{664}{1716}$	to 1
9 out of 15 is	9949 to	6435,		1	$\frac{3514}{6435}$	to 1
10 out of 17 is	20613 to	12155,		1	$\frac{8458}{12155}$	to 1
not 11, is	21879 to	10889,		2	$\frac{101}{10889}$	to 1
11 out of 19 is	84883 to	46189,		1	$\frac{38694}{46189}$	to 1
not 12, is	20995 to	11773,		1	$\frac{9222}{11773}$	to 1
12 out of 21 is	173965 to	88179,		1	$\frac{85786}{88179}$	to 1
not 13, is	323323 to	200965,		1	$\frac{122358}{200965}$	to 1
13 out of 23 is	2842226 to	1352078,		2	$\frac{69035}{676039}$	to 1
not 14 is	156009 to	106135,		1	$\frac{49874}{106135}$	to 1

A TABLE of CHANCES when the Odds are 5 to 1.

	1	2	3	4	5	6	7	
0	1	1	1	1	1	1	For getting 7 Aces with 7 Dice, there is 1 Chance	1
1	5	10	15	20	25	30	6 Aces —— ——	35
2		25	75	150	250	375	5 Aces —— ——	525
3			125	500	1250	2500	4 Aces —— —	4375
4				625	3125	9375	3 Aces —— —	21875
5					3125	18750	2 Aces ——	65625
6						15625	1 Ace ——	109375
7							——	78125
	6	36	216	1296	7776	46656		279936

One or Two Aces and no more, with 7 Dice is 175000 to 94936.

TABLE ſhewing the Odds againſt each Side winning Two Battles running.

The Strong Side.									Odds in each.	The Weak Side.								
l.	*s.*	*d.*	*q.*			*l.*	*s.*	*d.*		*l.*	*s.*	*d.*	*q.*			*l.*	*s.*	*d.*
0	12	0			to	0	4	0	1 to 1	0	12	0			to	0	4	0
0	11	2	$\frac{3}{4}$	$\frac{381}{441}$	to	0	4	0	21 to 20	0	12	9	$\frac{1}{2}$	$\frac{352}{400}$	to	0	4	0
0	10	6	$\frac{3}{4}$	$\frac{93}{121}$	to	0	4	0	11 to 10	0	13	7	$\frac{1}{2}$	$\frac{72}{100}$	to	0	4	0
0	10	5	$\frac{1}{4}$	$\frac{3}{25}$	to	0	4	0	10 to 9	0	13	9	$\frac{3}{4}$	$\frac{57}{81}$	to	0	4	0
0	10	3	$\frac{1}{4}$	$\frac{1}{27}$	to	0	4	0	9 to 8	0	14	0	$\frac{3}{4}$		to	0	4	0
0	10	0	$\frac{3}{4}$		to	0	4	0	8 to 7	0	14	4	$\frac{1}{4}$	$\frac{31}{49}$	to	0	4	0
0	9	9	$\frac{1}{2}$	$\frac{10}{49}$	to	0	4	0	7 to 6	0	14	9	$\frac{1}{4}$	$\frac{1}{3}$	to	0	4	0
0	9	5	$\frac{1}{4}$	$\frac{1}{3}$	to	0	4	0	6 to 5	0	15	4	$\frac{1}{4}$	$\frac{7}{25}$	to	0	4	0
0	8	11	$\frac{1}{4}$	$\frac{2}{25}$	to	0	4	0	5 to 4	0	16	3			to	0	4	0

The TABLE shewing the Odds each Side winning Two Battles running; continued.

The Strong Side.								Odds in each.	The Weak Side.							
l.	*s.*	*d.*	*q.*		*l.*	*s.*	*d.*		*l.*	*s.*	*d.*	*q.*		*l.*	*s.*	*d.*
0	8	3		to	0	4	0	8 to 6	0	17	9	$\frac{1}{4}$ $\frac{1}{3}$	to	0	4	0
0	7	9	$\frac{12}{49}$	to	0	4	0	7 to 5	0	19	0	$\frac{1}{4}$ $\frac{23}{29}$	to	0	4	0
0	7	1	$\frac{1}{4}$ $\frac{1}{3}$	to	0	4	0	6 to 4	1	1	0		to	0	4	0
0	6	6	$\frac{3}{4}$	to	0	4	0	8 to 5	1	3	0	$\frac{1}{4}$ $\frac{23}{25}$	to	0	4	0
0	6	2	$\frac{3}{4}$ $\frac{13}{25}$	to	0	4	0	5 to 3	1	4	5	$\frac{1}{4}$ $\frac{1}{3}$	to	0	4	0
0	5	10	$\frac{1}{2}$ $\frac{6}{49}$	to	0	4	0	7 to 4	1	6	3		to	0	4	0
0	5	8	$\frac{48}{81}$	to	0	4	0	9 to 5	1	7	4	$\frac{1}{4}$ $\frac{7}{25}$	to	0	4	0
0	5	0		to	0	4	0	2 to 1	1	12	0		to	0	4	0

The Use of the foregoing Table.

Suppose a Match between York and Leeds, and the odds are 6 to 5 Leeds against York each Battle; it will be 9 s. 5 d. $\frac{1}{4}$, and $\frac{1}{3}$ of a farthing, to 4 s. that Leeds does not win the next Two Battles; and it is 15 s. 4 d. $\frac{1}{4}$, and $\frac{7}{25}$ of a farthing to 4 s. that York does not win the next Two Battles.

If the bets are 8 to 7 each Battle, in favour of Leeds, then it is 10 s. and $\frac{3}{4}$ q. to 4 s. that Leeds does not win the next Two Battles; and 14 s. 4 d. $\frac{1}{4}$, and $\frac{31}{49}$ to 4 s. York does not win the next Two Battles.

LOTTERIES.

EXAMPLE I.

LET there be a Lottery, consisting of One Hundred Tickets, wherein there are Four Prizes; it is almost 15 to 2 that in taking Three Tickets they shall all come up Blanks.

EXAMPLE II.

Suppose a Lottery, consisting of a great number of Tickets, wherein are Three Blanks to a Prize, and that you were to take Seven Tickets; then it will be 4547 to 3645 (nearly) almost 5 to 4 there comes out two Prizes; and in taking Thirty-one Tickets, the odds will be in your favour that you get Eight Prizes.

EXAMPLE III.

There is a Lottery, consisting of Ten Thousand Tickets, among which there are Three particular Prizes, and that if a person takes Two Thousand, then it will be 124 to 1 (nearly) that he don't get all the Three Prizes. And it is likewise to be observed, that it is 124952004 to 121973001, or a guinea to a pound (nearly) that there comes out none of the said Prizes.

RAF-

RAFFLES.

Ten Dice.

THERE are Fifty-one Points or Numbers to be thrown upon Ten Dice, for Ten is the loweſt Number, and Sixty the higheſt.

Now let us ſuppoſe that there is one of theſe Raffles that has Twenty-ſix Prizes in it, and only Twenty-five Numbers are Blanks; that is to ſay, the following numbers, viz. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, and 60, are all Prizes, and the reſt, viz. 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, and 47, are all Blanks.

Now ſome people that are not well acquainted with the nature of Chances, may think that it is 26 to 25 every time you throw that you get a Prize; whereas, it is far otherways, for the exact odds is 59332954 to 1133222, or $52\frac{405418}{1133222}$, or better than $52\frac{1}{3}$ to 1, that you throw a Blank, as you may ſee in the following Table of Ten Dice, for if you add all the Chances for getting the 13 loweſt Points, to all the Chances for getting the 13 higheſt Points, their ſum will be only 1133222; and the ſum of the 25 middle Chances, will be 59332954, and therefore the odds againſt throwing a Prize is 59332954 to 1133222, as above.

A TABLE

A TABLE shewing the Chances, by which any number of Points may be thrown precisely, with Ten common Dice.

Points.		Chances.	Points.		Chances.
10	60	1	23	47	383470
11	59	10	24	46	576565
12	58	55	25	45	831204
13	57	220	26	44	1151370
14	56	715	27	43	1535040
15	55	2002	28	42	1972630
16	54	4995	29	41	2446300
17	53	11340	30	40	2930455
18	52	26760	31	39	3393610
19	51	46420	32	38	3801535
20	50	85228	33	37	4121260
21	49	147940	34	36	4325310
22	48	243925	35	35	4395456

Total of all the Chances 60466176.

Suppose there were 10 prizes of 50 guineas each, viz. No. 10, 11, 12, 13, 14, 56, 57, 58, 59, and 60; I say, suppose they were each a prize of 50 guineas, it is 30201 $\frac{1772}{2000}$ to 1, against getting any one of them.

A TABLE

TABLES of all the Chances upon

Nine Dice.

N°.	Chances.	N°.
9	1	54
10	9	53
11	45	52
12	165	51
13	495	50
14	1287	49
15	2994	48
16	6354	47
17	12465	46
18	22825	45
19	39303	44
20	63999	43
21	98979	42
22	145899	41
23	205560	40
24	277464	39
25	359469	38
26	447669	37
27	536569	36
28	619569	35
29	689715	34
30	7·0619	33
31	767394	32

Total 10077696.

Eight Dice.

N°.	Chances.	N°.
8	1	48
9	8	47
10	36	46
11	120	45
12	330	44
13	792	43
14	1708	42
15	3368	41
16	6147	40
17	10480	39
18	16808	38
19	25488	37
20	36688	36
21	50288	35
22	65808	34
23	82384	33
24	98813	32
25	113688	31
26	125588	30
27	133288	29
28	135954	28

Total 1679616.

TABLES

TABLES ſhewing all the Chances upon

Seven Dice.

Nº.	Chances.	Nº.
7	1	42
8	7	41
9	28	40
10	84	39
11	210	38
12	462	37
13	917	36
14	1667	35
15	2807	34
16	4417	33
17	6538	32
18	9142	31
19	12117	30
20	15267	29
21	18327	28
22	20993	27
23	22967	26
24	24017	25

Total 279936

Six Dice.

Nº.	Chances.	Nº.
6	1	36
7	6	35
8	21	34
9	56	33
10	126	32
11	252	31
12	456	30
13	756	29
14	1161	28
15	1666	27
16	2247	26
17	2856	25
18	3431	24
19	3906	23
20	4221	22
21	4332	21

Total 46656

It is 44220 to 2436, that you do not throw 4 equal faces with 6 dice, for $1 + 30 + 375 = 406 \times 6 = 2436$. (See the Table of 5 to 1, Page 51.)

Five Dice calculated 7776 Chances.

N°.	Chances.	N°.
5	1	30
6	5	29
7	15	28
8	55	27
9	70	26
10	126	25
11	205	24
12	305	23
13	420	22
14	540	21
15	651	20
16	735	19
17	780	18

For throwing 5 aces with 5 Dice, there is only 1 chance; for throwing 4 aces, there are 25 chances; and for 3 aces, 250; in all, 276 chances, for throwing 3 or more aces, which being multiplied by 6, gives 1656, the chances for throwing 3 or more equal faces, which subtracted from 7776, the remainder is 6120,

so

ſo it is 6120 to 1656 againſt throwing 3 equal faces. (See the Table of 5 to 1, Page 51.)

A undertakes to throw 3, or more equal faces, with 5 Dice, before B throws 2, or more aces. What is the odds?

ANSWER.

1656 to 1526 in favour of A.

Four Dice calculated 1296 Chances.

N°.	Chances.	N°.
4	1	24
5	4	23
6	10	22
7	20	21
8	35	20
9	56	19
10	80	18
11	104	17
12	125	16
13	140	15
14	146	14

With 4 Dice you have 1 chance for throwing 4 ſixes; 20 for throwing 3 ſixes; 150 for throwing 2 ſixes; 500 for 1 ſix; and 625 for not throwing a ſix; in all 1296. (See the Table of 5 to 1, Page 51.)

The

The ſame for 5, 4, 3, 2, and 1, ſo that it is 671 to 625 that I throw a ſix. For throwing 2 ſixes, 3 ſixes, or 4 ſixes, there are 171 chances; which being multiplied by 6, the product is 1026, ſubtracted from the total number of chances, the remainder will be 270, ſo it is 1026 to 270, or $3\frac{216}{270}$ to 1 that you throw two equal faces.

Three Dice calculated 216 Chances.

Nº.	Chances.	Nº.	Chances.
3	1	11	27
4	3	12	25
5	6	13	21
6	10	14	15
7	15	15	10
8	21	16	6
9	25	17	3
10	27	18	1

It is 215 to 1 that you do not throw 3 ſixes. Neither 3 ſixes, nor 2 ſixes, is 200

to 16, or 25 to 2. That you do not throw a ſix, is 125 to 91. (See the Table of 5 to 1, page 51.) It is 120 to 96, that you do not throw two equal faces with 3 Dice.

A undertakes to throw 2 equal faces before an ace. What is the odds ?

ANSWER.

In favour of A's getting two equal faces before an ace, is 96 to 91.

Two Dice calculated 36 Chances.

N°.	Chances.
2	1
3	2
4	3
5	4
6	5
7	6
8	5
9	4
10	3
11	2
12	1
Total	36

It is 5 to 1 againſt throwing two equal faces ; but it is 9 to 6 nearly, that you throw

throw doublets once in 5 tryals. And that you throw doublets once in 4 tryals is 671 to 625. The ſame upon throwing 7.

A undertakes to throw 10 once, before 7 twice; the odds are in his favour as 5 to 4.

It is 671 to 625 that a 6 comes up at 2 throws.

7 or more, at each throw, is 21 to 15. 14 or more, in two throws, is 720 to 575. 21 or more, in three throws, is 25494 to 21162. Againſt throwing an Ace, is 25 to 11. For throwing Duce or Ace, is 5 to 4. For throwing Ace, Duce, or Tray, is 3 to 1.

The

The following TABLES will ſhew how many Chances may be thrown on any Number of Dice, from One to Six.

TABLE I.

Dice	Chances.					
1	1	2	3	4	5	6 Roots of Points on one Side.
2	1	4	9	16	25	36 Squares.
3	1	8	27	64	125	216 Cubes.
4	1	16	81	256	625	1296 Biquadrates.
5	1	32	243	1024	3125	7776 Surfollids.
6	1	64	729	4096	15625	46656 Squared Cubes.

The uppermoſt figures involved, produce the powers under them.

The right-hand column ſhews the greateſt number of Chances that is on any number of Dice, from 1 to 6; that under 5, is the number without a 6; that under the 4, the number without 5 and 6.

And, that this is no more ſtrange than true, is here demonſtrated by the ſeveral ways that the greateſt number of Chances on 2 Dice is 36, which is equal to the ſquare of the greateſt number of points on one ſide of a Dice.

TABLE

TABLE II.

The particular Chances on 2 Dice are thus:

1,1	2,1	3,1	4,1	5,1	6,1
1,2	2,2	3,2	4,2	5,2	6,2
1,3	2,3	3,3	4,3	5,3	6,3
1,4	2,4	3,4	4,4	5,4	6,4
1,5	2,5	3,5	4,5	5,5	6,5
1,6	2,6	3,6	4,6	5,6	6,6
6+	6+	6+	6+	6+	6=36 in all.

Note, + signifieth more, and = equal to.

TABLE III.

A Second Way, thus:

1,1	1,2	2,3	3,4	4,5	5,6
2,2	1,3	2,4	3,5	4,6	——
3,3	1,4	2,5	3,6	——	1
4,4	1,5	2,6	——	2	+2
5,5	1,6	——	3		3
6,6	——	4			+4
——	5				+5
6					+6
					——
					=21 Sum.

Farther,

2,1	3,2	4,3	5,4	6,5
3,1	4,2	5,3	6,4	——
4,1	5,2	6,3	——	+1
5,1	6,2	——	+2	2
6,1	——	+3		3
——	+4			4
5				5

Chances = 15 + 21 = 36 as before.

TABLE IV.

A Third Way for particular Chances on 2 Dice.

Casts.	Points.	Chances.
2	1,1	1
3	2,1 1,2	2
4	2,2 1,3 3,1	3
5	4,1 1,4 3,2 2,3	4

Casts.	Points.	Chances.
6	5,1	
	1,5	
	4,2	5
	2,4	
	3,3	
7	6,1	
	1,6	
	5,2	
	2,5	6
	4,3	21=Sum.
	3,4	
8	4,4	
	6,2	
	2,6	5
	5,3	
	3,5	
9	6,3	
	3,6	
	5,4	4
	4,5	

10 —

Casts.	Points.	Chances.
10	5,5	
	4,6	3
	6,4	
11	6,5	2
	5,6	
12	6,6	1

Sum 15 + 21
= 36, Sum total as before.

Also in farther use of Table 1, to demonstrate that the chances answer to the number of points in the uppermost line, and the number of dice in the left-hand column thus, against 2 dice, and under 3 stands 9, which shews there are 9 chances on 2 dice, when the greatest number of points, are but 3 on those dice.

Demonstrated thus:

$$\begin{array}{ccc} & \text{Points.} & \\ 1 & \text{and} & 1 \\ 2 & \text{———} & 2 \\ 3 & \text{———} & 3 \\ 1 & \text{———} & 2 \\ 2 & \text{———} & 1 \\ 1 & \text{———} & 3 \\ 3 & \text{———} & 1 \\ 2 & \text{———} & 3 \\ 3 & \text{———} & 2 \end{array}\left.\vphantom{\begin{array}{c}1\\1\\1\\1\\1\\1\\1\\1\\1\end{array}}\right\}\text{Sum} = 9 \text{ Chances.}$$

Secondly, That there are but 8 chances on 3 Dice, when the greatest number of points therein are 2. Thus:

$$\begin{array}{ccccc} & & \text{Points.} & & \\ 1 & \text{and} & 1 & \text{and} & 1 \\ 2 & \text{——} & 2 & \text{——} & 2 \\ 2 & \text{——} & 1 & \text{——} & 1 \\ 1 & \text{——} & 1 & \text{——} & 2 \\ 1 & \text{——} & 2 & \text{——} & 1 \\ 2 & \text{——} & 1 & \text{——} & 2 \\ 2 & \text{——} & 2 & \text{——} & 1 \\ 1 & \text{——} & 2 & \text{——} & 2 \end{array}\left.\vphantom{\begin{array}{c}1\\1\\1\\1\\1\\1\\1\\1\end{array}}\right\}\begin{array}{c}\text{Sum} = 8 \text{ Chances,} \\ \text{or by the Table.}\end{array}$$

Thirdly,

Thirdly, That there are 27 Chances on 3 Dice, when the greatest Number of Points thereon are 3. Thus:

Points.	Char
1,1,1 ——	1
2,2,2 ——	1
3,3,3 ——	1
1,2,2 ——	2
1,3,3 ——	2
1,2,3 ——	2
1,2,1 ——	1
1,1,2 ——	2
1,1,3 ——	2
1,3,1 ——	1
2,1,2 ——	1
2,3,2 ——	1
2,3,3 ——	2
2,1,3 ——	2
2,3,1 ——	2
3,1,3 ——	1
3,2,2 ——	2
3,2,3 ——	1
	27 = Sum Total.

BACK GAMMON.

THE ODDS OF THE GAME.

THE Odds of 2 Love, is about 5 to 2.
And of 2 to 1, is 2 to 1.
And of 1 Love, is 3 to 2.

A TABLE of Points with the Chances for Hitting.

Diftance of Points.		Chances for Hitting.		Cannot be hit.	Points open.	Chances for Entering.
1	10	11	3			
2	11	12	2	13	1	11
3	12	14	3	14	2	20
4	15	15	1	17	3	27
5	16	15	1	19	4	32
6	18	17	1	21	5	35
7	20	6	1	22		
8	24	6	1	23		
9		5				

The

The Uſe of the foregoing TABLE.

Suppoſe you have a man out, which cannot be hit but with an Ace; look in the left-hand column for 1, and againſt it in the next column is 11, which being ſubtracted from 36, leaves 25. Therefore it is 25 to 11 it is not hit.

EXAMPLE II.

If a man is 5 points off you, What are odds againſt hitting that man?

ANSWER.

21 to 15 that he is not hit. For as there are 36 chances upon 2 Dice, and only 15 for hitting, it muſt 21 to 15 that he cannot be hit.

EXAMPLE III.

If a man is 6 points off, the chance for that man being hit is 17, and therefore the odds are 19 to 17, that he is not hit.

EXAMPLE IV.

If a man is 13, 14, 17, 19, 21, 22, or 23 points off, he cannot be hit.

EXAMPLE V.

If you have a man to enter, and only 1 point open, there are 11 chances for entering; therefore the odds are 25 to 11 that you do not enter. But if there are 2 points open, then there are 20 chances for entering; therefore the odds for entering are 20 to 16, or 5 to 4.

A Table ſhewing how to play the 36 Chances of Dice, at the Beginning of a Hit.

1	1	B : 5 :	5	4	*3 .
6	6	B : *B :	5	3	3 :
3	3	5 : 3 :	5	2	5 . 2 .
3	3	5 : *4 :	5	1	5 . 5 .
2	2	4 : 2 :	5	1	5 . *2 :
2	2	4 : *3 :	4	3	4 . 3 .
4	4	5 :	4	2	4 :
4	4	*5 : 4 :	4	1	5 . 4 .
5	5	3 :	4	1	4 . *2 .
6	1	B :	3	2	3 . 2 .
6	2	5 .	3	1	5 :
6	3	*3 .	2	1	2 . 5 .
6	4	*2 .	2	1	2 . *2 .
6	5	*1 .			

The Explanation and Uſe of the foregoing Table.

Thoſe with no mark ſignify your own Tables, and the figures ſtanding upright, ſignify

ſignify within the Tables; thoſe ſtanding thus ∾ ſignify out of the Tables, and thoſe with this mark * ſignify your adverſary's Table: B ſignifies Barr Point.

Likewiſe, when two is braced together, the firſt is for a gammon, the ſecond for a hit; and laſtly, the dots thus . or thus : ſignifies one or two men to be played upon that point.

And the uſe of it is, to ſhew how to play any of the 36 chances at the beginning of a hit; either for a gammon, or for a hit only.

EXAMPLE. I.

Two fours to be brought over from the five men placed in your adverſary's Tables, and

and to be put upon the Cinque point, in your own Tables, for a gammon only.

But if you play for a hit, two of them are to take your adverſary's Cinque point in his Tables ; and for the other two, two men are to brought from the five men in your adverſary's Tables.

EXAMPLE II.

Duce, Ace.

Bring one man, from the five men placed in your adverſary's Table, and put it upon Duce point out of your own Tables, and play the Ace upon the Cinque point in your own Tables, for a gammon only.

But if you play for a hit, then play the Duce from the five men placed in your adverſary's Tables, as before directed; and play the Ace from your adverſary's Ace point.

N. B. At the beginning of a ſet, do not play for a back game, becauſe by ſo doing, you will play to a great diſadvantage, running the riſk of a gammon, to win a ſingle hit.

Odds

W H I S T.

RULES to be attended to by every Learner.

I. SUpposing you have no other good cards besides five small trumps, then keep playing them about, and that will give your partner an opportunity of getting the tenace.

II. When you have a knave, a queen, and 3 small trumps, with a good suit, then lead the board with one of your small trumps.

III. If you have an ace, a king, and 4 small trumps, with a good suit, you must play 3 rounds of small trumps to prevent the great ones from being taken.

IV. When you have 4 small trumps with a king and a queen, and a good suit, then trump about with the king; for when the lead comes about you will still have 3 rounds of trumps.

V. If

V. If you have a ten and a knave, with 3 ſmall trumps, then trump about with 1 of the ſmall ones.

VI. If you have a ten, eight, a knave, and 2 ſmall trumps, with a good ſuit, you muſt trump about with the knave, which will bring out the nine at the ſecond round.

VII. If you have only one ſmall trump, with an eight, nine, and ten, then trump about with the ten.

VIII. If you have 4 ſmall trumps, with the queen and knave, then lead with the queen, becauſe it is probable your partner will have an honour, which by that means will be ſaved.

IX. If you have an ace, a king, and a knave, with 3 ſmall trumps, then play the king, by which you will have a fair chance of bringing out the queen.

X. When you have 4 ſmall trumps, with the king and queen, then begin with the ſmall

ſmall ones, becauſe it is probable one of the honours may be in the hand of your partner.

XI. When you have only ſix trumps of an inferior degree, then play the loweſt firſt, by which your adverſary will be obliged to play his honours to the beſt advantage.

XII. If you have 3 ſmall trumps, and a ten, then play one of the ſmall ones.

XIII. When you have 1 ſmall trump, with an eight, nine, and ten, then play the ten, becauſe your partner will then have an opportunity of paſſing it if he thinks proper.

XIV. If you have 3 ſmall trumps, with an ace, king, and knave, then play one of the ſmall ones, and you will force your antagoniſt to bring out his honours.

XV. Suppoſing your partner ſhould begin by leading the king of a ſuit, and it happens that you have more to anſwer it, then paſs it and throw away a loſing card, which will make room for the advantage you may take in the ſecond round.

The following Calculations will ſhew the truth of the above principles, eſpecially ſo far as they relate to your connection with a partner.

EXAMPLE I. For one Card.

That your Partner has not one certain card,	is 2 to 1

EXAMPLE II. For two Cards.

That he has not 2 certain Cards,	is 17 to 2
That he has not 1 of them only,	is 31 to 26
That he has 1, or both,	is 32 to 25
	Or 5 to 4

EXAMPLE III. For three Cards.

That he has not 3 certain Cards,	is 31 to 1
That he has not 2,	is 7 to 2
That he has not 1,	is 7 to 6
That he has either 1 or 2,	is 13 to 6
That he has 1, 2, or all 3,	is 5 to 2

A TABLE

A TABLE ſhewing the Chances for the Dealer and his Partner, holding 1, 2, 3, or 4 Honours, and contrary.

Chances for the Dealer and his Partner holding,		The Non-Dealers.
0	2691	4
1	14196	3
2	25350	2
3	18252	1
4	4485	0
	64974	

That there are not 4 by Honours, is 57798 to 7176, better than 8 to 1.

Not 2 by Honours only, is 32527 to 32448.

That the Honours counts, is 36924 to 25350, or 11 to 7, nearly.

That the Dealer is nothing by Honours, is 42237 to 22737, or 15 to 8, nearly.

A TABLE

A TABLE shewing the Chances for the Dealer holding any Number of Trumps, besides that turned up.

0	3910797436	0
1	20112672528	1
2	41959196136	2
3	46621329040	3
4	30454255260	4
5	12181702104	5
6	3014663652	6
7	455999544	7
8	40714245	8
9	2010580	9
10	48906	10
11	468	11
12	1	12
	158753389900	

By the above Table it appears, that it is 92777023800 to 65982666100 against the Dealer holding more than two Trumps, besides that turn'd up; or that he doth not hold four Trumps, about 7 to 5.

A TABLE

A TABLE ſhewing the Chances for a Perſon that is not Dealer, holding any Number of Trumps.

0	8122425444	0
1	46929569232	1
2	110619698904	2
3	139863987120	3
4	104897990340	4
5	48726808416	5
6	14211985788	6
7	2583997416	7
8	284999715	8
9	18095220	9
10	603174	10
11	8892	11
12	39	12
—	————	—
	476260169700	

It is 305535680700 to 170724489000 that a perſon that is not dealer doth not hold four trumps, about 9 to 5.

A TABLE shewing the Chances for some one's holding any number of Trumps.

4	55691522315	4
5	70390713393	5
6	26270012340	6
7	5598661068	7
8	740999259	8
9	58809465	9
10	2613754	10
11	57798	11
12	507	12
13	1	13
	158753389900	

It is 103061867585 to 55691522315 that some one holds five trumps, about 13 to 7.

A CASE

A CASE to demonſtrate the advantage by a Saw.

Suppoſe A and B partners, and that A has a quart-major in clubs, they being trumps; another quart-major in hearts, another quart-major in diamonds, and the ace of ſpades. And let us ſuppoſe the adverſaries, C and D, to have the following cards, viz. C has four trumps, eight hearts, and one ſpade; D has five trumps and eight diamonds: C being to lead, plays a heart, D trumps it: D plays a diamond, C trumps; and thus purſuing the Saw, each partner trumps a quart-major of A's; and C being to play at the ninth trick, plays a ſpade, which D trumps. Thus C and D have now the nine firſt tricks, and leave A, with his quart-major in trumps only.

The foregoing Caſe ſhews that whenever you gain the advantage of eſtabliſhing a Saw, it is to your intereſt to embrace it.

N. B. A quart-major ſignifies ace, king, queen, and knave in any ſuit.

A See-Saw

Is when each partner trumps a ſuit, and they play thoſe ſuits to one another to trump.

CRIBBAGE.

A critical Caſe at Cribbage.

A and B playing at five card Cribbage; A is 56, and B is only 5 and deals, and has three ſixes and two trays; A has ſix, ſeven, ten, and two trays; they each lay out two trays, and a nine turns up; A plays his ſeven, B plays a ſix; A plays his ſix, and ſets on two, B plays another ſix, and ſets on 6; then A cannot come in; B plays the fourth ſix, which makes 31; then he ſets on 14, which with the 6 he got before, makes 20 in play. A only got 2 in play, and 2 in hand, which makes him but 60; now B having 5 on, 20 in play, 12 in hand, and 24 in crib, is 61, the game.

ALL-FOURS.

A critical Caſe at ALL-FOURS.

A and B plays hearts, being trumps, A has ace, k ng, queen, jack, and duce of trumps, with the ten of diamonds; B has four ſmall clubs, knave of diamonds, and one ſmall trump. Now, if A does not mind very well, B will get the game; but if A takes care to throw away his ten of diamonds upon one of B's loſing cards, he will then get All Fours; for his game will be eleven, and B's only ten; whereas if A had ſuffered B to take his ten with the knave, then B would have eleven for his game, and A only ten.

P U T.

LET there be three heaps of cards laid upon the table, with their faces upwards; that is to ſay, let one of the heaps conſiſt of two kings and a tray; the ſecond, two duces, and a queen; and the third, three aces. Then A gives B the privilege of chooſing any one of the heaps; A takes one of the remaining heaps, and always beats B.

For when B takes two kings and a tray, A takes the three aces.

When B takes three aces, then A takes two duces, and a queen.

And when B takes two duces and a queen; then will A take two kings and a tray, by which means, which ever it is that plays firſt, B can never win.

Therefore the firſt choice is not always the beſt.

A TABLE ſhewing the Chances for getting any aſſigned Number at each End, when 2, 3, 4, or 6 People play.

Nº. at each end.	Number of Players. 2	3	4	6
0	3	10	35	462
1	2	4	20	252
2	1	1	10	126
3			4	56
4			1	21
5				6
6				1
	6	15	70	924

The Uſe of the foregoing Table.

If there are three Players, A, B, and C, then it is 14 to 1 that A does not get 2, and 10 to 5 he neither gets 1 nor 2 (juſt 2 to 1) and ſo of the reſt.

A TABLE

Odds of the Game.

When either Two or Four People play.

A wants	B wants	2 Players.	4 Players.
2	1	is 2 to 1	is $1\frac{4}{5}$ to 1
3	1	is $4\frac{1}{7}$ to 1	is $1\frac{1}{12}$ to 1
4	1	is $7\frac{4}{13}$ to 1	is $5\frac{29}{281}$ to 1
5	1	is $12\frac{37}{47}$ to 1	is $8\frac{761}{4251}$ to 1
3	2	is $1\frac{34}{37}$ to 1	is $1\frac{85}{129}$ to 1
4	2	is $3\frac{16}{77}$ to 1	is $2\frac{2039}{3322}$ to 1
5	2	is $5\frac{3}{13}$ to 1	is $3\frac{44824}{67829}$ to 1
4	3	is $1\frac{242}{365}$ to 1	is $1\frac{7268}{13173}$ to 1
5	3	is $\frac{2073}{3197}$ to 1	is $2\frac{42727}{142623}$ to 1
5	4	is $1\frac{7778}{13607}$ to 1	is $1\frac{97284594}{157243453}$ to 1

The Uſe of the above Table.

If A wants 4, and B wants 2, the odds are $3\frac{16}{77}$ to 1, if 2 play.

FINIS.